

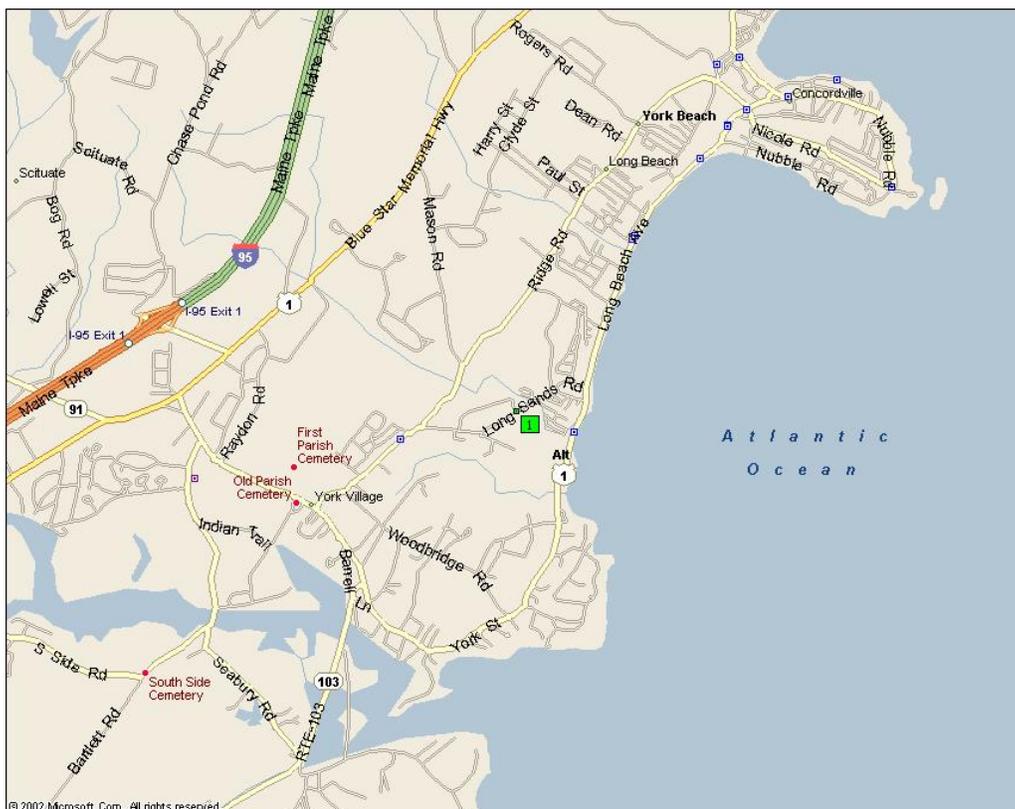
The Community of York, Maine Reaps the Benefits of Low-Pressure Sewer Technology

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By Henry Albro and Tim Haskell

The Community of York, located on the southern coast of Maine enjoys a steady year round population as well as a great deal of tourism. York is known for its beautiful coastal scenery, historical background and proximity to outlet stores. Many visitors to Maine make York their first stop along the way and stop to visit popular locations such as the York Harbor and York Beach.



¹Officially named York in 1642 after the fall of the loyalists, York has transformed and grown to become a very wonderful community. The Town's historical records state that the first sidewalks and public sewers were constructed in York Beach Village. The evolution of the governmental structure of York has seen the

¹ York, ME historical information collected from the official York Maine website www.yorkmaine.org.

development of sub-towns incorporated under separate governmental entities. The maintenance of separate services and the passage of time have resulted in a combined Town Government incorporating these previously separate communities within the present day York.

The York Sewer District, established in 1951, operates the public sewer collection system and wastewater treatment facilities. The YSD operates a system of gravity collection systems with lift stations that have been constructed and expanded over the years. York has developed comprehensive plans for growth and the expansion of services, including public sewers.

In 1999 the YSD began to look at two new sewer service areas known as Long Sands and Cow Beach. The combined project areas service 262 homes and an elementary school.

Design Approach

The project areas were placed under design review and cost evaluation. The Cow Beach area was commissioned to the local engineering firm of Anderson-Livingston. The Long Sands project was commissioned to the engineering firm of Weston & Sampson.

Cow Beach

The YSD originally requested designs showing a conventional gravity approach with a central pump station for the Cow Beach area. Due to the proximity of existing structures and the topography, it was necessary to locate the pumping station in a "Shore land Zone" near environmentally sensitive areas and near a beach area that was prone to flooding. During the planning stages the Planning Board and Zoning Board rejected this location. The gravity sewer designs also presented another set of issues. Several deep cuts of 18-20 feet in solid ledge would be required to maintain gravity flow over 600 linear feet. Due to these factors design costs alone were over \$50,000 dollars. This seasonal community would be severely affected by this type of construction. It became clear that the current approach was far too costly and many design and construction obstacles remained to be settled. The project budget of \$1.8M was clearly unreasonable and another alternative had to be found.

Sewer Superintendent, Tim Haskell had formerly operated Low-pressure sewer systems in Amesbury, MA and saw this technology as a possible way to make sewer service affordable for these projects. The District clearly wanted to explore and verify the cost options of gravity sewers and low-pressure sewers. A requirement of the SRF funding was that alternative methods be evaluated to provide the best cost alternative.

The YSD requested the designers modify the existing plans to show a low-pressure sewer alternative. The low-pressure sewer utilizes smaller diameter pipelines that are installed below the frost depth. The wastewater is transported through these lines by individual household grinder pumps. It was believed that the LPS technology would provide a substantial cost savings.

The added cost to revise the engineering plans was approximately \$9,000. The District supported this cost and was the only engineering amount added to the assessments. The original gravity sewer design cost was not placed on the resident's assessments. Local review by the Planning Board and Zoning Board were not required on the LPS system, as the individual house pump stations were not considered structures, since only the top few inches are exposed. All piping for the project was in the right of way and again did not require any in depth review. Now the District had a viable project with no more environmental or planning issues to solve.

Long Sands

Complete "conventional" sewerage for this area was expected to require pumping in some areas. The low-pressure sewer technology was deemed to be the most effective means to accomplish this. Cost comparisons were made with (4) four lift stations as an alternative in order to provide full gravity sewer service to the homes. At an estimated cost of \$85,000 each, pumpings station were quickly ruled out. The YSD chose to continue with their plans to use LPS and gravity as their design approach. Therefore the design of this project was based on a hybrid approach with gravity sewers utilized in areas of higher lot density and where standard construction methods could be used. Areas that were more difficult to service with gravity sewer were designed with low-pressure sewer technology. Approximately 80 of the 200 properties to be serviced in this area would be serviced by grinder pumps.

Construction Planning

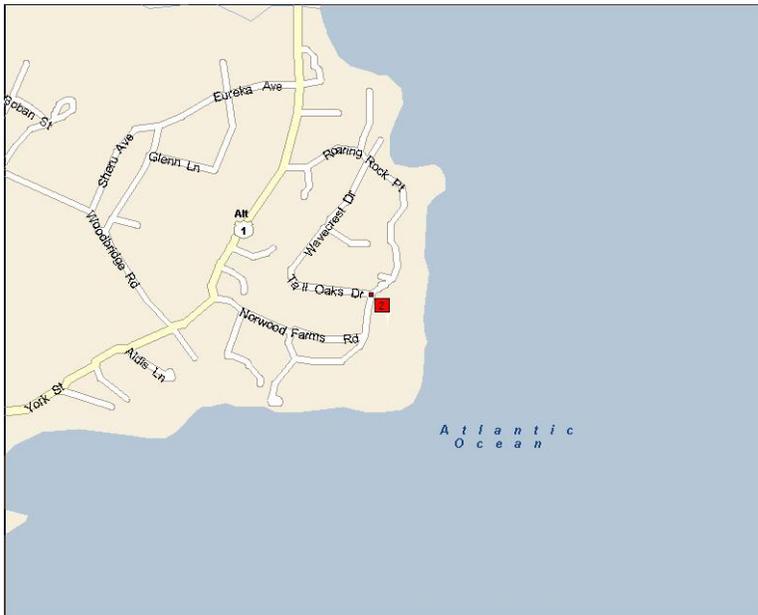
The YSD developed a public notification plan to review the alternatives and to provide public education to the citizens. In the fall of 2001 the District began scheduling a series of public meetings to discuss the sewerage options with the residents. Presentation of the LPS technology to the residents began in January of 2002. A citizen advisory committee inspected several existing LPS systems to evaluate the long term performance and reliability of this technology. After review of the project cost benefits and evaluation of the reliability of existing systems the York Sewer District moved forward with establishment of its first LPS system.

While low-pressure sewers have a long and well documented history, the YSD was embarking on something new. The YSD had to make some decisions regarding the scope of involvement and how this system would be managed and operated. It was decided to have the YSD manage the selection, installation and

maintenance of grinder pumps within the service areas. The District reviewed the performance history of LPS systems.

The YSD decided to standardize the low-pressure system's grinder pumps to one manufacturer and developed bidding specifications to meet their needs. The YSD was approved to utilize a sole source purchasing by the Maine DEP in order to achieve this goal. A two-year contract was awarded to Environment One Corporation through the local representation of F. R. Mahony & Associates, Inc. The contract included the delivery of 160 grinder pumps to the District. The sewer construction was modified to meet the new design.

Cow Beach



The Cow Beach Project included 62 grinder pumps and 6,381 feet of LPS mainline and 7,165 feet of LPS service lines. The total construction cost for this project including the installation of the pumps was \$868,607.50. The District saw a noticeable savings as the engineer's original estimate for this project was \$1,875,000. The average cost per foot of LPS main and service lines was \$51.60 per foot. The pump installation cost per home was \$2,650.00. The Cow Beach area was completed in a 5 month timeframe under a compressed seasonal construction plan.

²Cow Beach Unit Costs for Mainline Work

3-Inch LPS Main	1602 LF	\$20.00
3-Inch LPS in Ledge	1600 LF	\$49.00
2-Inch LPS Main	1882 LF	\$17.75
2-Inch LPS in Ledge	1279 LF	\$47.00

Cow Beach Unit Costs for Service Line Work

1-1/2- Inch Service	3,770 LF	\$19.75
1-1/2-Inch Service in Ledge	2,815 LF	\$41.50
2-1/2-Inch LPS Service	0 LF	\$16.755
2-1/2 Inch LPS Service in Ledge	580 LF	\$48.00

Cow Beach Unit Costs for LPS Appurtenances

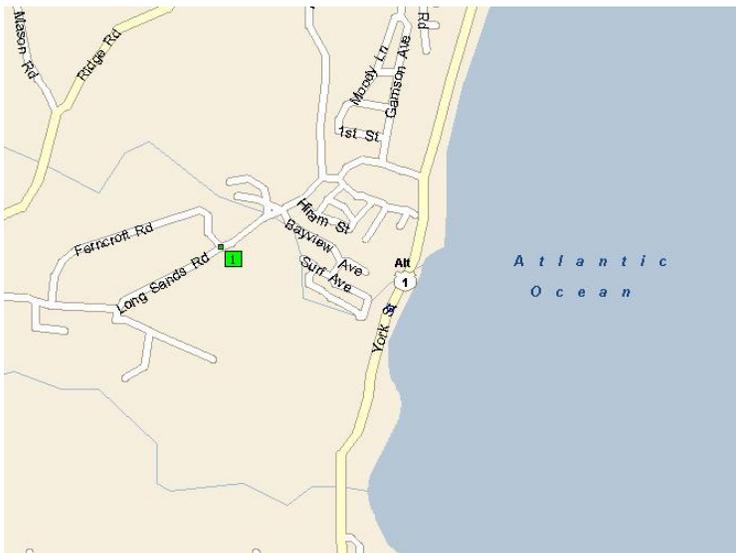
Flushing Manhole	8 Each	\$350
Flushing Manholes in Ledge	15 Each	\$475

¹ Bid tabulations from Payment Requisition Form

Other unit pricing included items such as paving restoration, loam and seed work, test pits and other typical construction pay items.

Long Sands

The Long Sands project area was found to be more conducive to a hybrid combination of gravity and low-pressure sewers.



The terrain and higher lot density in the Long Sands area made it easier to serve portions of this area with gravity sewers.

This area was served by a mix of 8 and 10-inch gravity sewers and 2 and 3-inch PVC LPS mains. 113 gravity sewer services and 81 household grinder pump installations were

included in the final scope of supply. The Long Sands project also included several Public Works improvements that were included in the construction contract. The YSD included road improvements, water line improvements and replacement of box culverts that accounted for \$300,000 of the total project cost.

³Long Sands Unit Costs for LPS Mainline Work

3-Inch LPS Main	1800 LF	\$18.00
3-Inch LPS in Ledge	1675 LF	\$44.00
2-Inch LPS Main	1500 LF	\$16.00
2-Inch LPS in Ledge	2700 LF	\$43.00

Long Sands Unit Costs for Gravity Mainline Work

8-Inch PVC 0-12 feet	3,600	\$38.00
8-Inch PVC 0-12 feet in ledge	4,250	\$60.00
10-Inch PVC 0-12 feet	1,100	\$40.00
10-Inch PVC 0-12 in ledge	1,250	\$65.50
10-Inch PVC >12' in ledge	1,030	\$77.50

There were again several other key bid items that are standard with sewer construction and are too numerous to list here. These included such items as, 590 sewer manholes, 900 feet of 6-inch forcemain, roadway restoration items, etc. The total project cost of \$2,038,833.84 resulted in an overall average cost per pipeline foot of less than \$71.

Grinder Pumps

During construction, the staff of the York Sewer District was provided with installation and service training at their Bay Haven Road Wastewater Treatment facility. The staff of the YSD took an active role in the oversight of pump installation and start up. Pumps were delivered to the WWTF in bulk deliveries and taken to resident's homes for installation by the general contractor. Each pump start up was controlled by the YSD and verified by service staff of F. R. Mahony & Associates.

It should be noted that the low-pressure sewer portions of each project included the installation of the grinder pump and service for each property.

Conclusion

The project enjoyed an overall success. In the words of Tim Haskell "this was a textbook case for low-pressure sewers". The greatest obstacles faced by the District were the work of private property installations. Defining the scope of bidding for each property clearly made for a difficult task. The wide range of landscaping from home to home proved to be a challenge. While intended as a

³ Bid tabulations from Payment Requisition Form.

means to provide uniform costs to each resident and to gain the lowest installation cost, it was hard to satisfy all of the resident's expectations of lawn and yard restoration. The District will most likely look at this policy with greater scrutiny for future projects.

The York Sewer District is quite pleased with the project results and the cost savings to the system's users. The project was completed on time and under budget. The resultant average cost per home was \$14,500 including the installation of main lines, service laterals, and pump installation on the Cow Beach Project.

The average per property cost on the Long Sands Project was approximately \$11,000 dollars, mainly due to the higher density of homes to share the costs.

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